



# Oregon

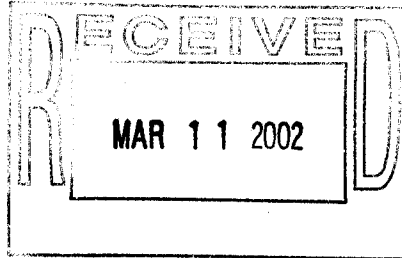
John A. Kitzhaber, M.D., Governor

## Department of Fish and Wildlife

Northwest Regional Office  
7118 NE Vandenberg Ave.  
Corvallis, OR 97330-9446  
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March 6, 2002



Ann Terbush  
Office of Protected Resources – F/PR1  
National Marine Fisheries Service  
1315 East West Hwy – SSMC3  
Silver Spring, MD 20910

Dear Ms. Terbush:

Attached is an application for a scientific research permit for studies of Steller sea lion population biology at rookeries and haul-out areas in the Pacific Northwest. The Oregon Department of Fish & Wildlife (ODFW) has been conducting research and monitoring activities on Steller sea lions in this area since 1985 (Research Permit Nos. 499, 835, and 854). Currently, aerial surveys, ground counts, and food habits sample collection activities are carried out under Research Permit No. 782-1446. As part of a new cooperative effort, ODFW and the National Marine Mammal Laboratory (NMML) have begun marking and monitoring the survival of Steller sea lion pups at rookeries in Oregon (under Research Permit No. 782-1532-00). The attached request would provide a separate permit for handling, marking, remote and on-site monitoring, estimation of survival rates, and related biological sampling activities specific to Steller sea lion rookeries in the Pacific Northwest. For administrative purposes, we are requesting that the lead authority to continue this work be granted specifically to ODFW (in cooperation with NMML). This does not represent a request for new types of research activities or takes that would not be authorized under existing permits.

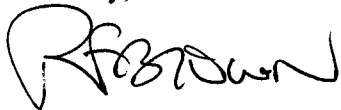
We feel that a research permit specific to this segment of the eastern Steller stock is appropriate given the differences in population status and condition between the Pacific Northwest and many areas in Alaska. The Oregon breeding population has increased at an average annual rate of 3.9% since the late 1970's; during the breeding season the regional population now numbers nearly 5,000 animals (ODFW, unpub. data). Among other activities, we are requesting a permit to capture, measure, weigh, sample (blood, tissue, swabs), tag, attach instruments, and hot-brand (in specified combinations) up to 200 sea lion pups and 30 juveniles/older pups each year. We are requesting that up to 10 handling-related, accidental mortalities be permitted before research activities are suspended in any one year. We are further requesting that the described research activities be permitted for a 5-year period beginning as soon as possible (to include the July 2002 field season) through December 31, 2006.

434-1669

I would like to reiterate that the type of research described in this permit application is already being conducted under currently authorized NMFS permits held by NMML, has already received public review and comment, and has been addressed in the Environmental Assessment process. We are simply requesting an administrative shift of lead research authority for the work conducted in this geographic area from NMFS to ODFW. I would also like to make it clear that ODFW is the only agency, and ODFW staff and cooperators are the only individuals, currently conducting on-site research at Steller sea lion rookeries in this portion of the breeding range. All of our activities are coordinated directly with NMFS and no duplication of effort or redundant activities are currently preformed in this area, nor are they proposed in this permit application.

Thank you for your time and effort in reviewing this permit request. Please feel free to contact me with questions at anytime ([robin.f.brown@state.or.us](mailto:robin.f.brown@state.or.us) ; 541-757-4186, x242; FAX 757-4252).

Sincerely,

A handwritten signature in black ink, appearing to read 'R. Brown', with a stylized, cursive script.

Robin F. Brown  
Program Leader  
Marine Mammals Research

**I. APPLICATION FOR A PERMIT FOR SCIENTIFIC RESEARCH UNDER THE MARINE MAMMAL PROTECTION ACT AND FOR SCIENTIFIC PURPOSES UNDER THE ENDANGERED SPECIES ACT**

**II. DATE OF APPLICATION**

6 March 2002

**III. APPLICANT AND PERSONNEL**

**A. Applicant** Robin F. Brown  
Oregon Department of Fish and Wildlife  
7118 NE Vandenberg Avenue  
Corvallis, Oregon 97330-9446  
541-757-4186, x-242 (FAX 757-4252)  
robin.f.brown@state.or.us

**Principal Investigator** Robin F. Brown  
Program Leader  
Marine Mammal Research

**Co-Investigators** Robert DeLong  
Jeff Laake  
Bryan Wright  
Susan Reimer  
Sharon Melin  
Pat Gearin  
Brad Hanson  
Steven Jeffries  
John Sease  
Thomas Loughlin

**B. Experience and Qualifications**

1. Robin Brown, Marine Mammal Research Program Leader, Oregon Department of Fish and Wildlife, has been involved with marine mammal research in the Pacific Northwest since 1975, including studies of pinniped population biology, behavior, food habits, and interactions with fisheries. He has conducted Steller sea lion research since 1984 and has worked cooperatively with NMFS, NMML, ADFG and WDFW staff on a variety of Steller sea lion research activities (CV on file with the Office of Protected Resources).
2. Robert DeLong, Ph.D., California Current Ecosystem Program Leader at the NMML, has been involved with marine mammal research since 1962, including population biology of northern fur seals, Steller sea lions, California sea lions, Guadalupe fur seals, Hawaiian monk seals, harbor seals and northern elephant seals (CV on file with the Office of Protected Resources).

3. Jeff Laake, Ph.D., California Current Ecosystem Program at the NMML, has been involved in marine mammal population assessment since 1992, including survey design, and analysis of data from surveys and mark-recapture studies (CV on file with the Office of Protected Resources).
4. Bryan Wright, Marine Mammal Research Program, Oregon Department of Fish and Wildlife, is the Program Biometrician and has been involved with wildlife research since 1989 and marine mammal research and assessments since 2000, including survey design, sampling protocol, and statistical analyses (CV is included with this permit application).
5. Susan Riemer, Marine Mammal Research Program, Oregon Department of Fish and Wildlife, has been involved in marine mammal research activities in Oregon since 1990, including aerial photographic surveys, pinniped population assessments, capture and marking studies, and food habits analysis (CV on file with the Office of Protected Resources).
6. Sharon Melin, Ph.D., California Current Ecosystem Program at the NMML, has been involved in marine mammal research since 1988, including population and vital rate assessments of California sea lions and northern fur seals (CV on file with the Office of Protected Resources).
7. Patrick Gearin, California Current Ecosystem Program at the NMML, has been involved in marine mammal research and assessments since 1980, including population assessments of pinnipeds and cetaceans (CV on file with Office of Protected Resources).
8. Brad Hanson, Ph.D., California Current Ecosystem Program at the NMML, has been involved in marine mammal research since 1976, including population assessments of pinnipeds and small cetaceans (CV on file with the Office of Protected Resources).
9. Steven Jeffries, Marine Mammal Investigations, Washington Department of Fish and Wildlife, has been involved with marine mammal research in the Pacific Northwest since 1975, including pinniped population assessments, reproduction, behavior, food habits and fishery interactions (CV on file with the Office of Protected Resources).
10. John Sease, Alaska Ecosystem Program at the NMML, has been involved with marine mammal research since 1977, and Steller sea lions since 1986. He has worked at the NMML since 1991 and has gained extensive experience in population assessments, and animal capture and handling techniques (CV on file with the Office of Protected Resources).
11. Thomas R. Loughlin, Ph.D., Alaska Ecosystem Program Leader at the NMML, has been involved with marine mammal research since 1973, including behavioral studies of sea otters, assessment of abundance and trends of harbor seals, Steller sea lions, and northern fur seals, and foraging ecology of Steller sea lions and northern fur seals (C.V. on file with the Office of Protected Resources).

All research and contracts awarded for research under this permit will be supervised by Robin Brown. Field operations will be directly supervised by the Principal Investigator and Co-Investigators.

### **C. Cooperating Institutions**

1. National Marine Mammal Laboratory  
Alaska Fisheries Science Center  
National Marine Fisheries Service  
Bldg. 4, 7600 Sand Point Way, N.E.  
Seattle, WA 98115
2. Oregon State University  
Department of Fisheries and Wildlife  
Hatfield Marine Science Center  
Newport, OR 97330
3. Washington Department of Fish and Wildlife  
Marine Mammal Investigations  
7801 Phillips Road SW  
Tacoma, WA 98498
4. U.S. Fish and Wildlife Service  
Oregon Coastal Refuges  
2127 SE OSU Drive  
Newport, OR 97365

## **IV. DESCRIPTION OF PROPOSED SCIENTIFIC RESEARCH**

### **A. Summary**

This permit application covers a significant part of the long-term and multi-faceted Steller sea lion research program that Oregon Department of Fish and Wildlife (ODFW) has conducted during the previous two decades under Scientific Research Permit Nos. 449, 835, 854 and 782-1446. As such, the permit covers a wide variety of inter-dependent research activities and many different kinds of takes, including incidental disturbance of animals on rookeries and haulouts during pup surveys, marking of pups for long-term demographic and distribution studies, attachment of scientific instruments to investigate foraging ecology and diving behavior, and repair and maintenance of remote sensing/monitoring equipment (incidental disturbance during ground, boat and aerial surveys, and scat collection activities is currently covered under NMFS Permit # 782-1446). These activities address the most pressing research needs as identified by the Steller Sea Lion Recovery Team (National Marine Fisheries Service 1992), incorporating revisions and advice from workshops convened by the Recovery Team during 1998 and 1999 to review telemetry, physiology, and behavior/rookery-based research. Fieldwork will take place during all

seasons of the year and throughout the range of the Steller sea lion in the Pacific Northwest (northern California, Oregon and Washington).

During recent years the ODFW has focused field operations during the breeding season (June/July) and seasonally for food habits sample collections throughout the year. Because ODFW personnel collaborate with colleagues from NMFS, Washington, and California, ODFW is in a unique position to participate in field operations anywhere within the Pacific Northwest at any time during the year. All field operations will be supervised directly by the Principal Investigator or Co-Investigators listed above. This permit does not involve intentional lethal take or captive removal of marine mammals. ODFW and the cooperators listed above are the only researchers currently conducting work in this portion of the Steller sea lion's range. All activities on the Steller sea lion rookeries in the Pacific Northwest have been and will continue to be directly overseen and coordinated by ODFW under this permit and under NMFS Permit No. 782-1446.

The type of research described in this permit application is already being conducted under currently authorized permits held by NMML, has already received public review and comment, and has been addressed in the Environmental Assessment process. In this application we are requesting an administrative shift of lead research authority for the work conducted in this geographic area from NMFS to ODFW. ODFW is the only agency, and ODFW staff and cooperators are the only individuals, currently conducting on-site research at Steller sea lion rookeries in this portion of the breeding range. All ODFW activities are coordinated directly with NMFS and no duplication of effort nor redundant activities are currently preformed in this area, nor are they proposed in this permit application.

## **B. Description of the Marine Mammals to be Taken**

**Species and Stocks:** We request authority to take Steller sea lions (*Eumetopias jubatus*) during 5 years of continuing research, through 31 December 2006. This request applies only to animals from the eastern stock of Steller sea lions.

**Numbers of Takes:** This permit will cover a wide-ranging research program, with many different kinds of takes. Proposed takes, age and sex of target animals, and times and areas of operation for specific aspects of this research are summarized in Table 1 and described in detail in the appropriate sections below.

1. The following numbers of animals may be taken by disturbance during pup counts in June and July:
  - a. A maximum of 2,600 non-pups and 1200 pups each year during pup counts on selected rookeries in Oregon and northern California.
2. A maximum of 200 pups may be captured and handled in June and July during any given year on selected rookeries:
  - a. Up to 200 pups at any given rookery may be branded with sequential numbers for

- long-term identification and estimation of vital parameters. All pups to be branded will be anesthetized with isoflurane gas to reduce stress.
- b. All captured pups will be weighed, measured, and flipper tagged.
  - c. All tagged pups may have flipper punch tissue retained for genetic analysis.
  - d. Up to 50 pups will have 25 cc of blood drawn.
  - e. Up to 50 pups will have oral, nasal and rectal swabs taken for viral and bacterial analysis.
  - f. Up to 50 will have a fecal sample taken to screen for endoparasites.
  - g. For any handled pups that exhibit external signs of disease we will take swabs of dermal lesions and ocular, nasal, oral, rectal, and/or vaginal areas, as appropriate.
3. A maximum of 30 juvenile sea lions and pups  $\geq 4$  months old may be captured and handled each year, during all months of the year, on or adjacent to rookeries and haulouts. Captures will be accomplished by two techniques: on land using hoop nets or underwater by SCUBA divers using lassos.
- a. All captured pups and juveniles may be weighed, measured, flipper tagged, and branded with sequential numbers for long-term identification and estimation of vital parameters. All animals to be branded will be anesthetized with isoflurane gas to reduce stress,
  - b. All tagged pups and juveniles may have flipper punch tissue retained for genetic analysis,
  - c. Blood may be drawn for physiological analyses (25cc for pups; 40cc for juveniles),
  - d. Oral, nasal and rectal swabs taken for viral and bacterial analysis,
  - e. Fecal samples taken for disease, hormone, genetic, and endoparasite analyses,
  - f. Enemas to recover prey remains from the lower digestive tract,
  - g. Scientific instruments may be attached to up to 10 pups and juveniles each year to identify habitat use, areas of biological significance and to investigate feeding ecology, and
  - h. For any handled pups and juveniles that exhibit external signs of disease we will take swabs of dermal lesions and ocular, nasal, oral, rectal, and/or vaginal areas, as appropriate.
4. An additional maximum of 10,000 animals may be disturbed each year on haulouts and rookeries for the following purposes, (these activities will typically take place concurrently with other tasks covered in this permit or under permit 782-1446 for scat collections and ground surveys):
- a. Establishing and maintaining remote monitoring stations,
  - b. Capture of juvenile sea lions in hoop nets on shore or underwater offshore.

***Size, sex, age, and reproductive status of sea lions taken:*** Proposed takes include sea lions from all age and sex categories, as summarized in Table 1 and described in detail in the appropriate sections below.

1. Pups captured or disturbed during June-July surveys at rookeries will be of both sexes and from a few days to 1½ months old.
2. Juvenile sea lions captured on land in hoop nets or captured underwater will include pups of the year greater than 4 months old and 1-, 2-, or 3-year olds of either sex.

***Status of Affected Population and Stocks:*** Numbers of Steller sea lions declined dramatically throughout much of the species' range, beginning in the mid- to late 1970s (Braham et al. 1980, Merrick et al. 1987, National Marine Fisheries Service 1992, National Marine Fisheries Service 1995). For two decades prior to the decline, the estimated total population was 250,000 to 300,000 animals. The population estimate declined by 50-60% to about 116,000 animals by 1989 (Loughlin et al. 1992), and by an additional 15% by 1994 (Sease et al., in press). Approximately 60% of Steller sea lions belong to the western stock, 40% to the eastern stock (Sease et al., in press). The decline has been restricted to the western stock. The western stock in Alaska has declined by about 5% per year during the 1990s (Table 2). During this same time, the eastern stock has increased by several percent per year in Southeast Alaska (Strick et al. 1997, Sease et al. 1999, Sease and Loughlin 1999), in British Columbia, Canada (P. Olesiuk, Department of Fisheries and Oceans, unpubl. Data), and in Oregon (Riemer et al. 2001; R. Brown, ODFW unpubl. Data).

The two rookeries in southern Oregon and the single rookery just south of the border in northern California constitute the largest reproductive aggregation of Steller sea lions in U.S. waters south of Alaska. ODFW has monitored Steller sea lion abundance and distribution at Orford Reef, Rogue Reef, and St. George Reef rookeries and at eight haul-out areas in Oregon by annual aerial photographic surveys since 1976 (Table 2). Despite significant population declines in other parts of the range, reproductive period trend counts of adult and juvenile Steller sea lions in this region have increased from several thousand animals in the mid-1970s to nearly 5,000 animals (adults, juveniles and pups) in 2001 at an average annual rate of 3.7% (R. Brown, Oregon Department of Fish and Wildlife, unpubl. Data; Riemer et al. 2001). In 1996 a total of 1,263 Steller pups were counted on the three primary sea lion rookeries in the region (NMFS/ODFW unpubl. data).

Steller sea lions were listed as "threatened" range-wide under the U.S. Endangered Species Act (ESA) on 26 November 1990 (55 Federal Register 49204). The population includes two stocks (eastern and western), separated at 144° W longitude (Loughlin 1997). The western stock was listed as "endangered" under the ESA on 4 May 1997 and the eastern stock remains classified as "threatened" (62 FR 24345). Steller sea lions are listed as "depleted" under the MMPA.

***Factors Affecting the Population and Stocks:*** The proximate cause of the Steller sea lion decline in areas other than the Pacific Northwest since the early 1980's appears due to reduced juvenile survival. Modeling by York (1994) found that reductions in juvenile survival could most easily produce the observed declines. This hypothesis is supported by observations conducted at Marmot Island, near Kodiak, Alaska. Of 751 pups branded at Marmot Island during 1987 and 1988, only 151 individuals (20.1%) were re-sighted as of December 1994, and only 31 of these were re-sighted more than once. Through the 1997 breeding season, only 14 females have been re-sighted on a rookery beach with a pup (Chumbley et al. 1997; NMML, unpubl. data). It is



assumed that most of the missing animals have died. Observations at other sites during the period also indicated that the number of juvenile animals had declined from the pre-decline period (Merrick et al. 1988).

Despite the identification of a likely proximate cause, the ultimate cause of the decline remains unknown. Several candidates have been examined and determined unlikely to have played a major role in the decline (although they may be important factors at current reduced population levels): redistribution of the population, harvests (commercial or subsistence), predation by killer whales or sharks, pollutant effects, and entanglement in marine debris (Merrick et al. 1987). Disease, though probably a contributing factor, cannot in itself be considered the cause – no widespread, acute epizootics have been observed. The candidate causes have now been reduced to incidental takes in commercial fisheries, shooting by fishermen and others, and changes in the abundance or quality of the prey base. Incidental take has resulted in the death of a large number of animals and was probably important in the early declines, both in the Aleutians and the Gulf of Alaska (Loughlin et al. 1983; Loughlin and Nelson 1986; Perez and Loughlin 1991). However, it does not appear to be a major factor today because the number of takes has declined to low levels. Shooting of sea lions has long been a source of mortality, but it is difficult to assess. This too appears to have declined based on observations from the Copper River Delta (Wynne 1990, Wynne et al. 1992, NMFS files), the one area where shooting has been systematically monitored, and from anecdotal reports from fishermen in other areas. What remains as a cause of the recent declines appears to be a decline in the prey base available to young sea lions. This may then result in a reduced nutritional plane that is translated into increased susceptibility to mortality from disease, parasitism, and predation. This would also explain the smaller size at age observed by Calkins and Goodwin (1988). However, the change in the prey base has not been identified.

Steller sea lion abundance at rookeries in the Pacific Northwest has been increasing (3.7% avg. annual rate 1976-2001, ODFW unpub. data) during much of the period that serious declines have been observed in areas west of the Gulf of Alaska. Shooting of Steller sea lions, while once common according to local anecdote, is not thought to have been a serious threat in this area since passage of the Marine Mammal Protection Act in 1972. With the exception of the mouth of the Rogue River on the southern Oregon coast, Steller sea lions rarely frequent nearshore areas where they might come in regular contact with human activities. Mortalities related to fishery interactions are thought to be minimal in this portion of the range. Most sea lions interacting with sport or commercial fisheries are reported to be California sea lions.

Food habits studies conducted during the summer reproductive period have shown Pacific whiting to be the dominate prey species taken by sea lions at the southern Oregon rookeries (Rierner and Brown, 1997; Rierner et al. 2001). Other frequently occurring prey include Pacific lamprey, salmonids, skates, pacific herring and rockfish species. Whiting constitutes the largest biomass of any single marine fish species in this region and has apparently been utilized consistently by Steller sea lions here. Due to several particularly strong year classes that occurred in the early 1980s, the regions whiting stock reached an historical high abundance level of 5.7 million t in 1987 (Dorn et al. 1999). However, the stock has been steadily declining since, perhaps due in part to an increase in the exploitation rate from less than 10% in the late 1980s to nearly 20% by the late 1990s. This harvest rate exceeds that for walleye pollock in the Gulf of Alaska and Bering Sea.

Currently, a new review and assessment of Pacific whiting stock status and harvest rates is underway. Any response by the regional sea lion population to the decline in whiting abundance over the past decade may not be detected for some time, if at all.

During the reproductive season, Steller sea lion abundance on the three primary rookeries in the Pacific Northwest is high. Such densities suggest that there may be little additional room for expansion at these sites. However, other somewhat smaller but suitable islands exist in the region which are currently used only as haul-out areas. The high animal densities on rookeries in Oregon may be partly responsible for the greater observed natural pup mortality that is typical of these sites, compared to other rookeries in Alaska (Loughlin, pers. comm.). In Oregon, it is not unusual to find 25-50 newborn pups dead on a rookery toward the end of the pupping season (ODFW, unpub. data).

**C. Import/Export of Marine Mammals or Parts/Products:** not applicable

**D. Description of the Proposed Activities**

1. ***Overall Duration, Dates, and Locations of the Proposed Research:*** We request that this permit be valid from the earliest possible date through 31 December 2006. We further request that the scope of the permit be California, Oregon and Washington.

Most of ODFW proposed activities will take place in specific areas and during specific times of the year. However, opportunities arise, frequently on short notice, whereby ODFW personnel are invited to participate in fieldwork with colleagues from other state and/or federal agencies in the U.S. Such collaborations provide opportunities to increase the scope of data and samples analyzed by the ODFW. The ability to make comparisons among different segments of the population that are experiencing different population trends may be critical in understanding the continuing population decline of the western stock. Accordingly, ODFW and NMML requests authority for takes to be Pacific Northwest-wide and year-round for particular task as appropriate.

2. ***Types of Takes Involved:*** This permit application includes many different kinds of takes within a variety of inter-dependent research programs and activities. Types of takes include the following:
  - a. disturbance during pup counts,
  - b. capture of pups ( $\leq 1\frac{1}{2}$  months old) on land for tagging, measuring, and weighing,
  - c. branding of newborn pups ( $\leq 1\frac{1}{2}$  months old), older pups ( $\geq 4$  months old) and juveniles ( $\leq 3$  years of age), including use of gas anesthesia to reduce stress and immobilize animals,
  - d. capture and instrumentation of pups ( $\geq 4$  months old) and juveniles ( $\leq 3$  years of age) on-land and underwater,
  - e. collecting blood and genetic samples from pups and juveniles,
  - f. swabs of lesions, eyes, throat, nose, genitalia, or rectum of animals exhibiting symptoms of disease, and fecal loop samples from pups and juveniles,

- g. incidental disturbance during set-up/maintenance of remote-monitoring stations,
- h. disturbance during collection of fecal material (covered under Permit 782-1446), and
- i. incidental disturbance during general observation and brand re-sight effort (covered under Permit 782-1446).

For purposes of clarity, research activities are presented separately below, grouped by tasks referenced to research needs identified by the Recovery Team. The description of each activity includes the kinds of takes required, their frequency, times and areas of operation, research objectives, methods, and anticipated results. The following descriptions also are summarized in Table 1.

#### **Element 1 – Surveys of Pups at Selected Pacific Northwest Rookeries**

- i. Objectives - The final Recovery Plan for Steller sea lions (NMFS 1992) identified the need for surveys of sea lion pups at selected rookeries in Oregon and northern California every 2<sup>nd</sup> year (research task 33) and range-wide surveys every 5<sup>th</sup> year (research task 341, 342). The range-wide pup survey changed from a 5-year to a 4-year schedule beginning in 1994, keeping parallel to the aerial survey schedule. The next scheduled range-wide survey will be in 2002. We also plan to assess and monitor the levels of pup mortality that occur on rookeries in the Pacific Northwest. These numbers will be compared to similar data collected in previous years and will provide supplemental information on population status and trends.
- ii. Methods - In the Pacific Northwest, in two of the next five years, we will conduct on-site pup counts at all rookeries to validate aerial photo surveys counts conducted under Permit No. 782-1446. In alternating years we will conduct breeding period counts at just one of three rookeries (e.g. site where marking activities occurs, see **Element 2** below). Survey protocols will be the same as in previous surveys (Sease et al. 1999, Sease and Loughlin 1999; ODFW unpubl. data). Pup counts will take place during the last week of June through the second week of July at rookeries in southern Oregon and northern California. The range-wide survey in 2002 and 2006 will include all rookeries in Alaska, Oregon and California. Pups are counted by first clearing the rookery of most sea lions other than pups. A biologist experienced in herding sea lions slowly moves non-pups away from the pups. After the non-pups have retreated, two or more biologists make independent counts of the live (and dead) pups on the rookery and in the water. Each year, after completion of the primary pupping/breeding period, we will conduct pup mortality counts on the alternate pup marking rookery (see **Element 2** below). These counts will be conducted in a manner similar to that described above, but will take place following the breeding period from mid-July through early August.
- iii. Expected results - Data from these surveys are used to determine the current status of the sea lion population for evaluation against recovery criteria. These data are

also used to evaluate and compare trends by sub-area and site to study causes of the decline, and the efficacy of any management actions taken.

## **Element 2 - Capture, Measure, Tag and Brand Pups on Rookeries During Breeding Season**

- i. Objectives - The final Recovery Plan for Steller sea lions (NMFS 1992) identified the need to monitor the health, condition, and vital parameters of sea lions (research task 4). More specifically, this included developing indices of condition (research task 432), obtaining measurements and samples using non-lethal techniques (research task 445), and tagging of pups on rookeries (task 443). The Recovery Plan also identified the importance of visual marking and tagging studies (research tasks 211, 212, and 444). Workshops convened by the Recovery Team on telemetry, behavioral, and physiological research on Steller sea lions emphasized the need for a large pool of permanently-marked animals in the population. Hot branding of pups is the most practical technique for permanently marking animals. The objectives of branding are to estimate survival rates, natality rates, and age at first reproduction in Steller sea lions in the Pacific Northwest for comparison with similar parameter estimates from the endangered western stock in Alaska. Branded animals also will provide information on seasonal movements, dispersal, and site fidelity.
- ii. Methods - We will capture, weigh, and measure up to 200 pups  $\leq 1\frac{1}{2}$  months old each year. Pups are captured by hand (see description below), placed in a hoop net for weighing, and restrained by hand during measurement, sampling, and tagging. Measurements will include standard length, axillary girth (immediately behind fore flippers), and flipper length. We will tag all handled pups for future identification using numbered Allflex plastic tags, color- and letter-coded by area within the Pacific Northwest. Pups captured during this research are approximately 1 week to  $1\frac{1}{2}$  months of age.

Up to 200 of the pups captured, measured, and tagged on rookeries during breeding season will also be branded. Pups may be corralled against cliffs or boulders and taken one-by-one to be weighed, measured, and branded. Alternatively, small groups of pups (30-50) may be gathered together and corralled loosely within a plastic mesh fenced area, and then removed one at a time for handling. The following description of the equipment and procedure for branding is summarized from Merrick et al. (1996). Branding irons are made of cold-rolled steel (approximately 10mm stock); the dimensions of the largest digits are approximately 5cm wide and 8cm high. Each iron is heated red hot in a portable, propane-fired forge and applied perpendicularly to the animal's shoulder with light, even pressure (ca. 5 psi) for 2-4 seconds. Digits will be 4-5cm apart to insure clarity of numbers. A 4-digit brand requires about 1.5 minute to complete. Pups are then released. Pups that are very young or in poor physical condition will not be branded.

Predicting a target sample size of marked animals for a project in an area where we have not conducted active mark-resighting efforts, and have no data to assess re-sighting probabilities, is difficult at best. Our only option is to use our experience from other areas as a guide to determine what sample size we expect is needed to detect a difference of interest. We are interested in measuring survival of juvenile Steller sea lions which we define as survival from pup to 4 years old and comparing our estimated survival to other studies in Alaska. It has been suggested by York (1994) that the dramatic decline in Steller sea lion abundance could be explained by a 10-20% decline in the annual juvenile survival rate. A 10-20% decline in annual survival translates to a 36-60% decline in survival from 0 to 4 years. We have assumed that annual survival will be 0.7, 0.8, 0.9, 0.9 for pups, yearlings, 2 year and 3 year olds, respectively, and similar to what we have measured for California sea lions. Those rates predict a survival of 45% of the pups to 4 years old. We have assumed that survival will vary by age but will be constant over time. We have simulated and estimated under this model for a ten year study in which a) 100 females and 100 males were branded each year, and b) 50 females and 50 males were branded each year. We know that survival differs between the sexes in California sea lions and we expect the same from Steller sea lions (York 1994). Therefore, we effectively halve our sample size to make inference about each sex. The biggest uncertainty is the annual probability of re-sighting ( $p$ ) a branded sea lion. We have examined scenarios in which  $p=0.1, 0.3$ , and  $0.5$  with power calculations. Our ability to detect differences in survival of sea lions at Rogue Reef and other study areas depends on both the sample size and the resulting re-sighting probability about which we know little at this point. A sample size of 100 males and 100 females will give us a good chance of detecting an important difference (power of .80 if  $p = \sim 0.3$  for a change of survival to age 4 of 36 %). If we were to halve that sample size we would fail to detect important differences unless we achieve extremely high sighting probability. We will not know  $p$  until we have both branded and re-sighted for two to three years. Choosing a sample size smaller than 200 sea lions potentially risks wasting several years of effort. If we do get high re-sighting probability we could consider reducing the sample size if our interest was solely juvenile survival.

We request the authority for the optional use of gas anesthesia (isoflurane) to reduce stress on pups and improve the quality of brands by preventing wiggling during branding. We will use the equipment and techniques developed and described in detail by Heath et al. (1996), Heath et al. (1997), and Haulena and Heath (2001). This technique has been used extensively and with Steller and California sea lions, both adults and pups, and was in fact developed primarily for and during field operations on these species in collaboration with the NMML and the ADF&G. We will deliver anesthesia to hand-restrained pups through a mask, which should be sufficient for the time requirements of branding. We also may deliver anesthesia by intubation with endotracheal tubes, which is the more usual method (Heath et al. 1997). Gas anesthesia has proven safe and effective with sea

lions. In this application it should eliminate much of the stress experienced by pups and improve the quality of brands by eliminating pup movement. Gas anesthesia will be administered and monitored only by personnel thoroughly trained in its application and with the direct supervision of a veterinarian. Any animals to be branded will be anesthetized prior to marking.

Hot-branding is the preferred method for producing permanent markings on sea lions safely and effectively. Dye-marks are lost during the next molt. Freeze-branding can produce long-lasting marks, but they may not be permanent. In addition, freeze branding requires 60 second iron exposure time to produce each digit, significantly increasing the time the animal is restrained (Merrick et al. 1996).

Hot branding has proven effective in practice. The Alaska Department of Fish and Game (ADF&G) branded 7,046 Steller sea lions with a single character at several rookeries and haulouts in Alaska in 1975-1976. The NMFS, with ADF&G and the Pacific Research Institute of Marine Fisheries and Oceanography (TINRO), branded 1,489 Steller sea lion pups at Marmot Island, Alaska, and at 4 rookeries in the Kuril Islands, Russia, from 1987 to 1989. ODFW branded over 200 Steller sea lion pups at Rogue Reef, Oregon in 1986, 1987, and 1988 (many of these animals have since been resighted from northern California to the Gulf of Alaska).

KAMCHATRYBVOD, in collaboration with NMFS, branded more than 500 Steller sea lion pups in the Kuril and Commander Islands in 1996. At San Miguel Island in California, the NMML and cooperators have branded more than 6,500 California sea lions since 1987. There is no evidence suggesting increased mortality of pups after branding (Merrick et al. 1996; Sharon Melin and Bob DeLong, NMML, personal communication and unpubl. data; ADF&G unpubl. data).

In the Pacific Northwest, pups were branded at Rogue Reef in 2001 and will be branded at either St. George Reef and/or Orford Reef in 2002; then again at Rogue Reef in 2003, and alternating to the other site in 2004, etc. Such a pattern of annual alternating sights of branding will allow for evaluation of the impacts of branding on each of the island populations.

Resight effort is fundamental for a successful branding program. A remotely controlled video camera system has been installed at Pyramid Rock, Rogue Reef, Oregon for resighting branded animals marked there in 2001. The video feed is received and the system is operated from the ODFW office in Gold Beach, Oregon. Biologists are able to manipulate the cameras on the island through a desk top computer to view all of the animals present on the island each day to look for branded animals. A second such camera will be installed on the branding site chosen for 2002. The signal will also be received at the ODFW office in Gold Beach where biologists will monitor the presence of branded animals. In addition biologists from ODFW and NMML will monitor other hauling areas in northern California, Oregon and Washington during the year to assess the presence of branded animals. This is particularly important and necessary because of the

behavior of Steller sea lion females which tend to move with the pup from the rookery island to alternate hauling sites during the non-breeding season.

- iii. Expected results - Previous branding efforts have provided extensive information about movements, dispersal, and site fidelity of sea lions in California, Oregon, Washington, Alaska, and Russia. Now that substantial numbers of branded California sea lions have recruited into the breeding population at San Miguel Island in California, the NMML has generated estimates of age specific survival and natality of sufficient precision to allow comparison of parameter estimates between populations and years. Similar results can be expected in for Steller sea lions in the Pacific Northwest.

### **Element 3 - Collect Blood and Tissue Samples from Pups and Juveniles**

- i. Objectives - The final Recovery Plan for Steller sea lions (NMFS 1992) identified the need to monitor the health, condition, and vital parameters of sea lions (research task 4). In conjunction with Oregon State University, ODFW has collected blood and tissue samples from Steller sea lion pups in Oregon to examine basic blood parameters, including viral screenings (Skilling et al. 1987, Barlough et al. 1987) and to provide samples to NMFS for genetic stock analysis. Research direction from the Recovery Plan also included developing indices of condition (research task 432) and obtaining measurements and samples using non-lethal techniques. The Recovery Plan further called for research to determine if biological parameters indicate different stocks of sea lions (research task 22).

The objectives of this research are to continue ongoing studies of the physical condition of pups and genetic variability within the population. Health and condition of the Pacific Northwest sea lion population is important for comparison to similar data from Alaskan for monitoring the population's status with respect to recovery, and for determining causes of the population decline. Results of recent genetic analyses (based on samples collected by these methods under NMFS Permits #809, #854, and #782-1447,) already have identified two separate stocks within the population (Bickham et al. 1996, Loughlin 1997). Continuing genetic research may provide a more detailed description of stock structure that affects future management actions and provide data on susceptibility to disease.

- ii. Methods - We propose to collect blood and tissue samples from a sample of pups ( $\leq 1\frac{1}{2}$  months old) captured on rookeries during the breeding season (**Element 2**, above). We will also collect these samples from pups ( $\geq 4$  months old) and juveniles ( $\leq 3$  years old) captured on rookeries and haulouts outside of the breeding season (as described in **Element 4** below). We propose drawing  $\leq 25$ cc from up to 50 pups captured on rookeries at the time of branding (mass of these pups varies from 15kg to 50kg) and from up to 30 older pups ( $\geq 4$  months old) and juveniles ( $\leq 3$  years old) captured on rookeries and haulouts outside of the breeding season.

Blood draws will be made by veterinarians participating in the field study, or by biologists trained/experienced in blood draw techniques.

Clinical blood chemistries are useful for examining the gross physiological status of individual animals. In other otariid species, electrolytes, oxygen carrying capacity (red blood cell indices), and immune system function (white blood cell indices) are highly useful for making inferences about the health of young animals. The NMML began analyzing blood from Steller sea lion pups in 1991. More thorough and regular monitoring of the clinical chemistries of pups began in 1998. Lymphocytes will be isolated from whole blood and cryo-preserved. Lymphocytes will be used to characterize immune function of animals and RNA will be isolated from lymphocytes and sequenced to characterize the variability in the major histocompatibility complex (MHC) which is responsible for control of the immune function of the animals.

From all captured pups and juveniles we will collect fecal samples using a sterilized fecal loop for determination of parasites, disease, and hormone concentrations. We propose using sterile rayon tipped bacterial culture swabs to sample dermal lesions, or ocular, rectal, oral, nasal and/or vaginal areas, as appropriate, from any handled pups exhibiting external signs of disease. Swabs will be taken and cultured according to standard veterinary procedures. From up to 50 pups annually, swabs will be taken for bacterial and viral culture to characterize the exposure of animals within the population to pathogens.

With pups ( $\geq 4$  months old) and juveniles, if we have reason to believe the captured animal recently returned from sea, we may administer an enema to recover remains of prey items from the lower digestive tract. A clean, lubricated enema tube is inserted into the rectum and 1-2 liters of warm water are gently applied to flush feces from the lower digestive tract. Fecal material is collected in a plastic bag for sieving and removal of prey remains in the laboratory. We will not administer enemas to pups  $\leq 1\frac{1}{2}$  months old.

Each year, from up to 200 pups at time of branding and from up to 30 juveniles and pups ( $\geq 4$  months old), we also propose to take a sample of skin for genetic analyses. The sample is collected with a sterile biopsy punch from near the trailing edge each of the fore flippers creating a hole through which a flipper tag will be placed. Samples will be preserved in ethyl alcohol or salt brine and DMSO for future analysis of mitochondrial and nucleic DNA.

- iii. Expected results - These data will provide information on the relative health of the Pacific Northwest population to be integrated into ongoing NMFS studies. They will be useful for comparison to known standards, to data collected in previous years, and to similar data collected in areas of population decline. New and additional genetic information will provide greater detail about genetic variability and stock structure of the sea lion population throughout the range.



#### Element 4 - Capture of Juveniles and Pups (Older than 4 Months)

- i. Objectives - The final Recovery Plan for Steller sea lions (NMFS 1992) identified the need to monitor the health, condition, and vital parameters of sea lions (research task 4). More specifically, this included developing indices of condition (research task 432) and obtaining measurements and samples using non-lethal techniques (research task 445). The Recovery Plan also called for research to determine if biological parameters indicate different stocks of sea lions (research task 22).

The objective of this research is to collect condition data from the Pacific Northwest for comparisons with similar ongoing studies of the physical condition and distribution of pups and juveniles outside of the breeding season (particularly during the winter) in Alaska. Juvenile survival likely is a key element in the continuing decline there and will be key to the recovery of the western stock of Steller sea lions. Availability and quality of food resources is a likely mechanism for influencing juvenile survival, especially during the winter. Assessing the condition, status, movements and foraging behavior of pups as they are weaned and of juvenile sea lions that are foraging for themselves is the most direct means to understand this critical time in a sea lion's life.

- ii. Methods - We propose capturing older pups and juveniles by two methods: on-land and underwater. Pups captured under this task will be  $\leq 4$  months old, during fall, winter, and spring research expeditions. Juveniles will be up to 3 years old. We propose capturing  $\leq 30$  animals in any given year.

We propose to capture pups on land with a large hoop net (3 ft. diameter and 5 ft. long handle) and physically restrain them. One or two biologists sneak up as close as possible to the target animal before entrapping it in the net. NMML personnel have used hoop nets to capture Steller sea lion pups in Alaska during March 1999 under NMFS Permit #782-1447 and more than 100 adult California sea lion (*Zalophus californianus*) females in California under NMFS Permit #977 (Sharon Melin, NMML, personal communication). This technique has proven safe for both the researchers and the animals and has never resulted in the death of an animal. After we capture an animal in the net, we will slowly transfer it into a fabric restraining wrap used for weighing the animal. We will keep the animal restrained in this wrap during measurements and while collecting samples.

We may capture pups and juveniles in the water using the lasso technique developed by colleagues with the Alaska Department of Fish and Game. Two or three divers, supported by a skiff and a larger vessel, approach a haulout under water. The natural curiosity of young sea lions draws them to the divers. After a brief period of accustomization, sea lions will approach close enough that a rope lasso tended by personnel in the skiff can be placed around them, slightly behind the

fore flippers, by the divers. The lasso is tightened and the rope is retrieved by the skiff crew. Animals are wrapped in a restraining net and pulled into the skiff and restrained by hand. This technique has proven to be effective and safe for divers and captured animals.

Captured animals will be weighed, measured, and tagged with numbered Allflex plastic tags, color-coded by area within the Pacific Northwest. Animals may be branded for permanent identification and would be anesthetized prior to marking (as described in **Element 2** above). We also propose to take a variety of tissue samples and cultures from these captured pups and juveniles, including blood, feces, and swabs (as described under **Element 3**, above).

We request the added authorization to administer a light dose of a tranquilizer (Valium or equivalent) to restrained, non-anesthetized animals as needed to calm them and minimize the potential for injury to animals and handlers. We propose to use Valium only in cases when we cannot draw blood because the animal is struggling in restraint. Dosages of Valium (5mg/ml concentration) are scaled according to size and age (5ml per 100kg) and injected intra-muscular in the rump area while the animal is restrained in the net. NMML personnel have used Valium at this dosage rate very successfully to aid in the physical restraint of more than 50 adult California sea lion females and more than 200 California sea lion pups ranging in age from 4 months to 11 months old (Sharon Melin, NMML, personal communication). ODFW staff have used light Valium doses on hundreds of harbor seals during capture and marking activities in the Pacific Northwest with great success and no associated mortalities. Low doses of Valium, as requested here, slightly relax animals after capture so that physical restraint is easier on both the animal and the field personnel. For California sea lions, the effect generally subsides 20 minutes after injection and the animals are fully functional at 20-30 minutes after injection, regardless of age or size. No mortalities of restrained California sea lions have ever been the result of the effects of Valium. Although different species may react differently to drugs, we believe that Valium is a safe drug to aid in the physical restraint of Steller sea lion pups and juveniles.

- iii. Expected results - These data will provide information on the relative health of the population when compared to results from preceding years, known standards, and similar data collected from areas of population decline in Alaska. These data will particularly address seasonal changes in distribution, movements and the physical condition of young sea lions, which will contribute to assessing the potential impacts of commercial fisheries, environmental changes, and any management actions on the status of sea lions.

#### **Element 5 - Attachment of Scientific Instruments to Juveniles and Pups (≥4 months old)**

- i. Objectives - The final Recovery Plan for Steller sea lions (NMFS 1992) identified

the need to identify habitat requirements and areas of biological significance for Steller sea lions and to investigate feeding ecology. Specific points in the step-down outline included the following: map, describe, and evaluate feeding areas (research task 112), determine seasonal use patterns (research task 12), identify and designate "Critical Habitat" areas (research task 15), identify feeding areas (research task 6131), and investigate diving behavior and feeding cycles (research task 6132). Participants in a telemetry workshop convened by the Recovery Team in December 1997 reiterated the importance of telemetry studies, especially those targeting feeding ecology and movements of juvenile sea lions.

Satellite-linked time depth recorders (SLTDRs) are the only practicable tool for following the movements of Steller sea lions during foraging trips and for monitoring diving behavior. This work will be used to identify foraging areas, particularly during winter, and to further refine our knowledge of the foraging capabilities of young sea lions. In turn, this information will help define the characteristics of foraging areas, and the relationships of these areas to areas of known prey concentrations and to commercial fisheries. VHF transmitters will help describe attendance and movement between selected sites. Underwater Timed Picture Recorders (UTPR, Wild Insight Ltd.) may be deployed on these animals to record up to 3 hours of still, time-lapse, or movie images. UTPRs are integrated with an incorporated Wildlife Computers Mark 7 time-depth recorder (TDR) to record dive behavior and start/stop image recording according to program directions. ODFW would deploy an UTPR in conjunction with a VHF transmitter and optionally a simple PTT (Sirtrack or Wildlife Computer SPOT tag). In combination, this will provide the most detail possible for location, dive behavior, and prey interaction currently available. VHF and PTT transmitters would be attached following protocols currently in the permit. The UTPR would be attached with a remotely release (by radio signal) platform following typical attachment protocols for SLTDRs. UTPRs would thus be retrieved without a recapture of the sea lion required.

- ii. Methods: ODFW proposes to attach scientific instruments to pups  $\geq 4$  months old and juveniles  $\leq 3$  years old. Details of takes and techniques for capture are described in **Element 4** of this application. We will attach SLTDRs, UTPRs, and VHF transmitters to the hair on the animal's back, just over the shoulders, with fast-setting epoxy glue. Signals from VHF transmitters will be monitored by land-based antenna systems; signals from SLTDRs are received by orbiting satellites, relayed to stations on Earth, recorded, and delivered to the investigators. This work will be conducted primarily in Oregon, but may occur region-wide in response to opportunities for collaboration with colleagues in other areas. The number of animals outfitted with instruments each year will be determined by budget limitations rather than more rigorous calculations of optimum or minimum sample sizes. We anticipate the maximum number of instrument packages that we will be able to attach in any given year is 10.

- iii. Expected results - Data obtained from SLTDRs, UTPRs, and VHF transmitters will contribute to the ODFW's ongoing investigations into seasonal movements, diving behavior, habitat selection, and foraging ecology of Steller sea lions. This work will be particularly important for identifying winter foraging areas and refining our knowledge of the foraging capabilities of young sea lions. This information will be crucial in assessing the potential effects of commercial fisheries on the status of Steller sea lions. These data will be of value for comparison to similar information collected in areas of Steller sea lion population decline.

**Element 6 – Resight observations of marked sea lions at Rookeries and Haulouts  
(Provided for under NMFS Research Permit No. 782-1446)**

- i. Objectives - The final Recovery Plan for Steller sea lions (NMFS 1992) identified the importance of visual marking and tagging studies (research tasks 211, 212, 443, and 444). A peer-review workshop on behavioral and rookery-based research, convened by the Recovery Team in December 1997, reiterated the need for longitudinal studies based on resighting permanently marked animals.
- ii. Methods – The primary method for monitoring sea lions on Rogue Reef, Orford Reef, and St. George Reef rookeries will be remotely controlled video cameras (**Element 7** below). However, the equally important and directly related task of visiting other hauling and breeding sights in California, Oregon and Washington to obtain counts and resights of branded animals is essential to this work. Animals tend to move away from the primary rookery areas following the breeding season and these site visits will provide all of the information on movements and distribution of marked animals during the non-breeding season period. Approximately two weeks of each month will be spent observing sea lions on other sites from Northern California to Washington from shore, from boats or on site to collect these data (the remaining time will be used for recording observations via remote cameras at primary rookeries; see **Element 7** below). These activities are currently funded and underway, but will be supported and coordinated under the new ODFW/NMML work just initiated this year. All incidental disturbance related to these visits are currently provided for under Research Permit No. 782-1446. This effort will not duplicate any efforts, visits or disturbance to sea lion rookeries or haul-out areas.
- iii. Expected results - These data will provide information on the distribution and abundance of sea lions at most of the rookeries and haul-out areas in the Pacific Northwest. Of particular importance will be the documentation of use of these areas seasonally and annually by individual animals by resights of marks or tags. These data can then be compared with historical data and with similar current data collected from other sites throughout the range to evaluate population status.

## **Element 7 - Establish and Maintain Remote Sensing Stations on Rookeries and Haulouts**

- i. Objectives – The final Recovery Plan for Steller sea lions (NMFS 1992) identified the need for land-based observational studies to monitor health, condition, and vital parameters. This study seeks to extend the period of observation to cover the entire year, not just the duration of occupation of a field camp.
  - ii. Methods – The ODFW and NMML propose to set up video cameras on two or three rookeries in southern Oregon and northern California. Cameras will be fix-mounted and aimed at the haul-out area from several vantage points, with data being transmitted back to a receiving station in the office of ODFW in Gold Beach, Oregon. Remotely-operated cameras can be directed to scan the haul-out area or zoom in on animals of particular interest to read and record brands and tags on marked animals. When cameras are in-place and functioning properly, approximately two weeks of each month will be dedicated to use of remote camera systems and resighting of marked individuals (the remaining time will be used for recording observations at other sites; see **Element 6** above). These video systems are operating successfully on a sea lion haulouts in the Gulf of Alaska (operated by the Alaska Sea Life Center, Seward, Alaska) and at Pyramid Rock, Rogue Reef in southern Oregon. The great value of the remote video systems is that allow data acquisition on a daily basis with little or no disturbance to animals. In addition to Rogue Reef we intend to install video camera on Southwest Rocks, St George Reef and possibly at Orford Reef.
  - iii. Expected results - Remote monitoring stations will provide a unique opportunity to data collect data on animal abundance and presence of marked individuals year-round. These monitoring stations will provide an opportunity to make behavioral observations under varying weather conditions throughout the year, to follow seasonal and annual movements and changes in abundance, and to record site attendance by branded and tagged individuals.
4. ***Intentional Lethal Takes:*** not applicable
  8. ***Captive Removal:*** not applicable
  9. ***Importation of Parts:*** Any importation of Steller sea lion parts or samples will be accomplished under the authority and conditions of existing NMML permit No. 782-1399 and its successors.

### **E. Describe Anticipated Effects of Proposed Activity**

1. Small adverse impacts may result from harassment associated with pup surveys, tagging, branding and effects of the tag or brand, and mortality due to handling. Using protocols developed over the past decades by ODFW AND NMML will minimize any adverse impacts to the greatest degree possible.

2. Impacts of the pup counts are potentially greater than from aerial surveys because most adult animals must be moved to the edge of the rookery or into the water to make the count. To minimize the impact of the counts, our protocol includes the following:
  - a. will not survey until the end of the pupping season (late June or later), after mother-pup bonds are well established;
  - b. minimize the time that we are occupying the rookery ( $\leq 2$  hrs for counting;  $\leq 12$  hrs for branding activities); and,
  - c. use biologists experienced in herding to slowly move the adults out of the way and experienced counters and handlers to complete the surveys as quickly as possible.
3. With respect to pup handling (e.g., capture, tagging and branding, blood draws) ODFW and NMML staff have now handled over 1,000 younger than 2 months old during the past 15 years with only four accidental mortalities. This may be due to the large size of the pups (up to 50 kg) but we also attribute this to the following:
  - a. Pups are processed in small groups. Prior to handling we round up a small pod of pups. These animals are allowed to rest before handling, are watched over for signs of distress, are kept cool (with water if necessary), and animals showing signs of distress are released.
  - b. Pups and juveniles are restrained by hand, until the cone of the anesthesia machine is placed over the nose. Induction of anesthesia generally occurs within a minute of coning, depending on the breathing rate of the pup. Anesthesia will be administered by a qualified veterinarian or a trained person under the direct supervision of a qualified veterinarian. Following anesthesia, pups are released and watched until recovered sufficiently that they can move away on their own.
4. All blood draws, fecal loops, enemas, swabs, and disease screening samples will be collected while the animals are under anesthesia and will be performed by personnel experienced with these procedures. These are standard procedures that are not known to be related to any long term negative impacts on the animals.
5. We anticipate the effects of biopsy sampling (flipper tag punch) to be minimal.
6. Effects of Allflex tags on pups seem to be minimal.
7. The ODFW and NMML anticipates no long-term adverse effects resulting from the attachment of scientific instruments to juveniles and pups  $\geq 4$  months old. The NMML has attached SLTDRs to more than 60 adult female and juvenile Steller sea lions in Alaska, Russia, and Washington State since 1989 with no indication of adverse impact to the animal. ODFW attached two SLTDRs to adult female Steller sea lions at Rogue Reef in 1997. Recent technology has led to miniaturization of instrument packages, which helps minimize effects caused by the weight and added drag. Packages currently in use,  $< 300\text{gm}$  with a cross sectional area of about  $10\text{cm}^2$ , are substantially smaller than

those used previously. Care will be taken during attachment to adjust the proportions of resin and catalyst to prevent a "hot" mix and to use the minimum practical amount of epoxy to prevent burning the sea lion's skin.

8. The ODFW and NMML anticipate no long-term adverse effects resulting from the administration of Valium (0.5mg/kg at dilution of 5mg/ml) to juveniles and pups  $\geq 4$  months old. NMML personnel have administered Valium successfully and safely to adult and pup California sea lions under NMFS Permits #717, #782, and #977 and to adult and juvenile northern fur seals under NMFS Permits #837 and #782-1455. ODFW staff have used Valium to calm harbor seals during handling under Research Permit #782-1446. We will not administer Valium routinely, but rather only to particular individuals that we judge would benefit from slight sedation.
9. Branding: In 1993 the NMML submitted to the NMFS Office of Protected Resources an environmental assessment on hot branding as a marking technique for pinnipeds. Temporary adverse impacts can include disturbance and stress of capture and handling. Some discomfort is likely to accompany the application of the brand. Experience with California sea lions in California, Oregon, and Washington and with Steller sea lions in Oregon, Washington, Alaska, and Russia suggests that this discomfort is simultaneous with the activity and not expected to result in long-term adverse effects. There is no evidence suggesting increased mortality of pups after branding; some branded individuals have been observed over a period of decades (ODFW, unpubl. data; Merrick et al. 1996; Chumbley et al. 1997; Sharon Melin and Bob DeLong, NMML, personal communication and unpubl. data; ADF&G unpubl. data). In 2001 following branding operations at Rogue Reef, branded and non branded pup mortalities were recorded. There was no significant difference in the number of branded and non branded pups within the pups that died. Thus it was unclear whether the mortality of those pups was in any way related to the handling activity or branding.
10. Gas anesthesia (isoflurane): The ODFW and NMML anticipates no adverse effects from the administration of gas anesthesia to pups during branding. This technique has proven extremely safe and effective on Steller and California sea lion pups (Heath et al. 1997; Haulena and Heath, 2001). Pups should actually benefit from the anesthesia, as they will be unaware of the activity around them, substantially reducing the stress they experience. Pups awake from gas anesthesia very quickly and appear completely recovered within 5-8 minutes.

#### **F. Where and When Results Will Be Published**

Results from previous Steller sea lion research conducted by the ODFW have been presented at Recovery Team working meetings, the biennial meetings of the Society for Marine Mammalogy, and annual meetings of The Wildlife Society. Newly acquired data on vital rate estimates and other scientific findings will be published in Marine Mammal Science, the publication of the Society for Marine Mammalogy.

**G. Captive Holding**

not applicable

**H. Other Related Proposals, Permits**

Steller sea lion aerial surveys conducted by the ODFW and NMML are carried out under NMFS Permit # 782-1446. Related NMML Steller research activities are conducted under NMFS Permit # 782-1532-00. Importation/exportation of tissues or samples will be carried out under the authority of the NMML's NMFS Permit # 782-1399.

The ODFW and NMML operate within the Oregon Coastal National Wildlife Refuge under the authority of Special Use Permits from the U.S. Fish and Wildlife Service.

**V. FOREIGN APPLICANTS**

not applicable

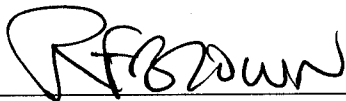
**VI. CERTIFICATION AND SIGNATURE**

I hereby certify that the foregoing information is complete, true, and correct to the best of my knowledge and belief. I understand that this information is submitted for the purpose of obtaining a permit under the following statutes and the regulations promulgated thereunder, as indicated in Section I. of this application:

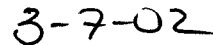
The Endangered Species Act of 1973 (16 U.S.C. 1531-1543) and regulations (50 CFR 222.23(b)); and

The Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407) and regulations (50 CFR Part 216).

I also understand that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001 or to penalties provided under the Endangered Species Act of 1973 or the Marine Mammal Protection Act of 1972.



Robin F. Brown, Program Leader  
Oregon Department of Fish and Wildlife



Date



## References

- Barlough, J. E., E. S. Berry, E. A. Goodwin, R. F. Brown, R. L. DeLong, and A. W. Smith. 1987. Antibodies to marine caliciviruses in the Steller sea lion (*Eumetopias jubatus schreber*). *Journal of Wildlife Diseases*, 23(1):34-44.
- Bickham, J.W., J.C. Patton, and T.R. Loughlin. 1996. High variability for control-region sequences in a marine mammal--implications for conservation and biogeography of Steller sea lion (*Eumetopias jubatus*). *Journal of Mammalogy* 77:95-108.
- Braham, H. W., R. D. Everitt, and D. J. Rugh. 1980. Northern sea lion population decline in the eastern Aleutian Islands. *Journal of Wildlife Management* 44:25-33.
- Calkins, D., and E. Goodwin. 1988. Investigations of the decline of Steller sea lions in the Gulf of Alaska. Unpubl. contract rpt. to the Nat. Mar. Mammal. Lab., April 1, 1988. Avail. Alaska Dept. Fish and Game, 333 Raspberry Rd, Anchorage, AK 99518.
- Chumbley, K., J. Sease, M. Strick, and R. Towell. 1997. Field Steller sea lions (*Eumetopias jubatus*) at Marmot Island, Alaska, 1979 through 1994. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-77, 99 pp.
- Dorn, M. W., M. W. Saunders, C. D. Wilson, M. A. Guttormsen, K. Cooke, R. Kieser, and M. E. Wilkins. 1999. Status of the coastal Pacific hake/whiting stock in U.S. and Canada in 1998. Alaska Fisheries Science Center Rep., available at [www.refm.noaa.gov/wc](http://www.refm.noaa.gov/wc).
- Haulena, M. and R.B. Heath. 2001. Marine Mammal Anesthesia. Chpt. 29, In: Dierauf, L. A. and F. M. D. Gulland (Eds), *CCR Handbook of Marine Mammal Medicine*, Second Edition. CCR Press. N. Y. 655-684.
- Heath, R.B., D. Calkins, D. McAllister, W. Taylor, and T. Spraker. 1996. Telazol and isoflurane field anesthesia in free-ranging Steller's sea lions (*Eumetopias jubatus*). *Journal of Zoo and Wildlife Medicine* 27:35-43.
- Heath, R.B., R. DeLong, V. Jameson, D. Bradley, and T. Spraker. 1997. Isoflurane anesthesia in free ranging sea lion pups. *Journal of Wildlife Diseases* 33:206-210.
- Loughlin, T.R. 1997. Using the phylogeographic method to identify Steller sea lion stocks. Pages 159-171 in A.E. Dizon, S.J. Chivers, and W.F. Perrin (editors), *Molecular genetics of marine mammals*. Soc. Mar. Mammal., Spec. Publ. No. 3.
- Loughlin, T.R., L. Consiglieri, R.L. DeLong, and A.T. Actor. 1983. Incidental catch of marine mammals by foreign fishing vessels, 1978-1981. *Marine Fisheries Review* 45:44-49.
- Loughlin, T.R., and R. Nelson. 1986. Incidental mortality of northern sea lions in Shelikof Strait, Alaska. *Marine Mammal Science* 2:14-33.

- Loughlin, T.R., A.S. Perlov, and V.A. Vladimirov. 1992. Range-Wide Survey and Estimation of Total Abundance of Steller Sea Lions in 1989. *Marine Mammal Science* 8:220-239.
- Merrick, R. L., T. R. Loughlin, and D. G. Calkins. 1987. Decline in abundance of the northern sea lion, *Eumetopias jubatus*, in Alaska, 1956-86. *Fishery Bulletin U.S.* 85:351-365.
- Merrick, R. L., T. R. Loughlin, and D. G. Calkins. 1996. Hot-branding: a technique for long-term marking of pinnipeds. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS-AFSC-68, 21 p.
- Merrick, R., P. Gearin, S. Osmek, and D. Withrow. 1988. Field studies of northern sea lions at Ugamak Island, Alaska during the 1985 and 1986 breeding seasons. U.S. Department of Commerce, NOAA Technical Memorandum NMFS F/NWC-143, 60 p.
- National Marine Fisheries Service (NMFS). 1992. Recovery plan for the Steller sea lion (*Eumetopias jubatus*). Prepared by the Steller Sea Lion Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland, 92 p.
- National Marine Fisheries Service (NMFS). 1995. Status review of the United States Steller sea lion (*Eumetopias jubatus*) population. Prepared by the National Marine Mammal Laboratory, Alaska Fisheries Science Center, Seattle, Washington, 45 pp.
- Perez, M. A. and T. R. Loughlin. 1991. Incidental catch of marine mammals by foreign and joint venture trawl vessels in the U. S. EEZ of the North Pacific, 1973-88. U.S. Dep. Commer. NOAA Tech. Rpt. NMFS-104, 57 p.
- Riemer S. D. and R. F. Brown. 1997. Prey of pinnipeds at selected sites in Oregon identified by scat (fecal) analysis, 1983-1996. OR. Dept. Fish & Wildl., Wildl. Diversity Prgm. Tech. Rep. #97-6-02. 34 pp.
- Reimer, S. D., R. F. Brown, and B. E. Wright. 2001. The Steller sea lion in Oregon. In: Abstracts, 14<sup>th</sup> Biennial Conference on the Biology of Marine Mammals, Nov. 28 – Dec. 3, 2001. Vancouver, B.C., Canada. 262 pp.
- Sease, J.L., J.M. Strick, R.M. Merrick, and J.P. Lewis. 1999. Aerial and land-based surveys of Steller sea lions (*Eumetopias jubatus*) in Alaska, June and July 1996. U.S. Dep. Commer., NOAA Technical Memorandum NMFS-AFSC-99, 43 pp.
- Sease, J.L., and T.R. Loughlin. 1999. Aerial and land-based surveys of Steller sea lions (*Eumetopias jubatus*) in Alaska, June and July 1997 and 19986. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-100, 61 pp.
- Sease, J. L., R. F. Brown, V. N. Burkanov, D. G. Calkins, P. F. Olesiuk, and A. E. York. In Press. Range-wide survey of Steller sea lions in 1994. *J. Wildl. Manage.*
- Skilling, D. E., J. E. Barlough, E. S. Berry, R. F. Brown, and A. W. Smith. 1987. First isolation of a calicivirus from the Steller sea lion (*Eumetopias jubatus*). *Journal of Wildlife Diseases*, 23(4):534-538.

- Strick, J.M., L.W. Fritz, and J.P. Lewis. 1997. Aerial and ship based surveys of Steller sea lions (*Eumetopias jubatus*) in Southeast Alaska, the Gulf of Alaska, and Aleutian Islands during June and July 1994. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS-AFSC-71, 55 pp.
- Wynne, K. 1990. Marine mammal interactions with the salmon drift gillnet fishery on the Copper River Delta, Alaska, 1988 and 1989. Sea Grant Technical Report No. 90-05. University of Alaska, Fairbanks.
- Wynne, K.M., D. Hicks, and N. Munro. 1992. 1991 Marine mammal observer program for the salmon driftnet fishery of Prince William Sound Alaska. Annual Report NMFS/NOAA Contract 50ABNF000036. NMFS Alaska Region, Office of Marine Mammals, P.O. Box 21668, Juneau, Alaska, 99802, 53 pp.
- York, A.E. 1994. The population dynamics of northern sea lions, 1975-1985. Marine Mammal Science 10:38-51.

Table 1.—Summary of proposed takes, age and sex of target animals, and areas of operation for specific components of the Steller sea lion research permit application by the Oregon Department of Fish & Wildlife, Corvallis, Oregon, Robin F. Brown, Applicant.

Element	Season	Region	Frequency	# animals each year (by age/sex as appropriate)	# animals in 5 years (by age/sex as appropriate)
1 Disturbance During Pup-count Surveys					
a) ≤2 selected rookeries	June-July	region-wide	2003, 2004, 2005	≤1,800 non-pups ≤900 pups	≤9,000 non-pups ≤4,500 pups
b) all (3) rookeries	June-July	region-wide	2002, 2006	≤2,600 non-pups ≤1,200 pups	≤13,000 non-pups ≤6,000 pups
Ground-based pup counts, require disturbance/displacement of most animals on each rookery.					
2 Capture, Weigh, Measure, Tag, Brand Pups on Rookeries					
During Breeding Season					
a) At 1 of 3 rookeries	June-July	region-wide	every year	≤200 pups	≤1,000 pups
During ground pup-count surveys ( <b>Element 1</b> ), capture pups on rookery to weigh, measure, tag, brand and release up to 200 pups at one rookery each year.					
We will attempt to capture and sample male and female pups in approximately equal numbers.					
We will administer gas anesthesia (isoflurane) to pups to reduce stress and to completely immobilize pups during branding.					

Element	Season	Region	Frequency	# animals each year (by age/sex as appropriate)	# animals in 5 years (by age/sex as appropriate)
3 Collect Blood & Tissue Samples from Pups and Juveniles					
a) At ≤2 selected rookeries	June-July	region-wide	every year	≤200 pups	≤1,000 pups
b) At any workable site	all year	region-wide	every year	≤30 juvs/older pups	≤150 juvs/older pups
<p>From a subset of the ≤200 pups per year when branding in <b>Element 2</b> collect ≤25cc blood from ≤50 pups.</p> <p>From all juveniles and pups ≥4 months old (<b>Elements 4</b>) collect a maximum of 40cc blood.</p> <p>From all handled animals (200 pups/year; 20 juveniles and older pups/year collect tissue sample (flipper punch) for genetic analysis.</p> <p>Fecal loop or rectal swab for uncontaminated fecal sample from most or all handled animals.</p> <p>Swabs of dermal lesions and ocular, rectal, and/or vaginal areas, as appropriate, from any handled animals exhibiting external signs of disease.</p> <p>Enemas for pups (≥4 months) and juveniles.</p>					
4 Capture of Juveniles and Pups (Older than 4 Months)					
At any workable site	all year	region-wide	every year	≤30 pups/juveniles ≤5,000 any age/sex	≤150 pups/juveniles ≤25,000 any age/sex
<p>Includes two capture methods:</p> <ol style="list-style-type: none"> <li>1) catching animals in hoop nets on land at rookeries and haulouts,</li> <li>2) catching animals underwater with divers using a rope lasso, a technique developed by ADF&amp;G.</li> </ol> <p>For both methods : hand restraint of captured animals, and use of Valium or equivalent as needed to make animals more manageable. All captured animals will be weighed and measured. See <b>Element 3</b> for details of tissue samples; <b>Element 2</b> for tagging; <b>Element 3</b> for details of genetic samples; <b>Element 5</b> for attachment of SL-TDR, UTPRs and/or VHF transmitters. Animals will be captured at any workable site region-wide.</p> <p>We will administer gas anesthesia (isoflurane) to pups to reduce stress and to completely immobilize any animals branded.</p> <p>Takes for disturbance of non-target animals at a site (any age/sex) are expected to be ≤5,000 in any one year. Such takes for disturbance of a site may be accounted for under NMFS Permit # 782-1446 for scat collection or ground/boat surveys to be conducted simultaneous to these activities (no duplication of disturbance for separate purposes will take place).</p>					

Element	Season	Region	Frequency	# animals each year (by age/sex as appropriate)	# animals in 5 years (by age/sex as appropriate)
5 Attachment of Scientific Instruments to Older Pups and Juveniles					
At any workable site	all year	region-wide	every year	≤30 pups/juveniles	≤150 pups/juveniles
We will capture and handle ≤30 older pups (≥4 months old) and juveniles (≤3 years old) each year ( <b>Element 4</b> ) in order to attach scientific instruments, including satellite-linked time-depth recorders, UTPRs and/or VHF transmitters. Total of ≤10 attachments in a given year. Instruments will be attached to hair on the animal's back with quick-curing epoxy glue.					
6 Resight Observations of Marked Sea Lions at Rookeries and Haul-out Areas					
At any workable site	all year	region-wide	every year	Incidental disturbance takes are provided under NMFS Permit 782-1446 Ground/Boat Surveys	Incidental disturbance takes are provided under NMFS Permit 782-1446 Ground /Boat Surveys
7 Establish/Maintain Remote Monitoring Stations on Rookeries and Haulouts					
≤3 selected sites	all year	region-wide	every year	≤5,000 any age/sex	≤25,000 any age/sex
Set up ≤3 remote video camera systems on rookeries or haulouts. Equipment will be located outside of and/or above the area occupied by sea lions. In most cases, setting up equipment and 3 to 5 visits annually for maintenance will result in additional takes by disturbance. Many of these takes will be accounted for under NMFS Permit # 782-1446 for scat collection or ground/boat surveys to be conducted simultaneous to these activities (no duplication of disturbance for separate purposes will take place).					

Element	Season	Region	Frequency	# animals each year (by age/sex as appropriate)	# animals in 5 years (by age/sex as appropriate)
8 Accidental Mortality During Field Operations					
all capture sites	all year	region-wide	every year	≤10 per year	≤30 during 5 years
<p>ODFW and Co-investigators will do everything within our power to avoid accidental, handling-related mortalities of sea lions as a consequence of the proposed research. However, accidental mortality is not entirely predictable and even though unlikely, unexpected, and often unexplainable, mortalities do occasionally take place. In addition, such mortalities generally occur stochastically and/or in numbers greater than one at any time. As stated in "Factors Affecting the population and Stocks", during the past 17 years that ODFW has been conducting Steller sea lion research on Pacific Northwest rookeries, it has been typical to find 25-50 dead newborn pups by the end of the breeding season on a single rookery, suggesting that the natural mortality rate of pups at these sites is high compared to other parts of the range (T. Loughlin, pers. comm.). Therefore, it can be anticipated that some number of the young sea lions we may capture and handle will, by chance, be from that portion of newborn animals that will not survive. For these reasons, the ODFW requests the authority for no more than 10 mortalities during a given year, and no more than 30 during the duration of the permit. Should a mortality occur, ODFW and NMML personnel will immediately review the circumstances with the goal of preventing recurrence.</p>					

Table 2.--Counts of adult and juvenile (non-pup) Steller sea lions in Oregon during June and July aerial surveys from 1976 to 2001. Average annual rate of increase is 3.7% (95% CI=2.9-4.4%).

Year	Total	Year	Total
1976	1,486	1989	2,183
1977	1,461	1990	2,414
1978	1,805	1991	3,091
1979	1,542	1992	3,581
1980	1,632	1993	2,838
1981	2,105	1994	3,301
1982	2,604	1995	3,837
1983	2,106	1996	3,205
1984	1,870	1997	3,897
1985	2,210	1998	3,971
1986	2,289	1999	3,275
1987	2,709	2000	2,930
1988	2,825	2001	3,648



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### EDUCATION

B.S., Wildlife, Humboldt State University, 1993. Magna cum laude.  
M.S., Statistics. Oregon State University, 1999.

### PROFESSIONAL RESEARCH INTERESTS

Finite population sampling; wildlife study design and analysis; computer simulation; GIS; wildlife ecology; pinniped-fishery interactions.

### EMPLOYMENT AND EXPERIENCE

Natural Resource Specialist 3: Oregon Department of Fish and Wildlife, Corvallis, OR. Employed: 7/00-present. Responsible for providing statistical support for Marine Mammal Program including study design, data collection, database management, data analysis, and data presentation.

Statistician I: AScl Corporation, US Geological Survey, Columbia Environmental Research Center, Columbia, MO. Employed: 5/99-6/00. Analyzed data collected on freshwater fishes for the USGS's Biomonitoring of Environmental Status and Trends program.

Graduate Teaching Assistant: Department of Statistics, Oregon State University, Corvallis, OR. Employed: 1/97-3/99. Taught undergraduate and graduate computer laboratory sections for a variety of statistical courses.

Research Technician: Forest Science Laboratory, Oregon State University, Corvallis, OR. Employed: 6/97-9/97. Collected field data on forest bat ecology.

Research Assistant I, II, and Program Manager: Manomet Center for Conservation Sciences, Manomet, MA. Employed: 4/94-9/96. Assisted with estuarine biomonitoring research and wading bird conservation studies along the northeastern US coast.

Wildlife Technician: Louisiana Cooperative Fish and Wildlife Research Unit, Louisiana State University, Baton Rouge, LA. Employed: 11/93-3/94. Collected field data on American Woodcock ecology.

Fish and Wildlife Scientific Aide: California Department of Fish and Game, Sacramento, CA. Employed: 6/93-8/93. Collected field data on morning dove ecology.

Biological Science Technician: National Park Service, Northwest Alaska Areas, Kotzebue, AK. Employed: 5/92-8/92. Collected field data on shorebird ecology.

Analyst: EG&G, Inc., Environmental Sciences Department, Las Vegas, NV. Employed: 5/91-8/91. Collected field data on plant and animal ecology at the Nevada Nuclear Test Site.

Biological Science Technician: Forest Service, Redwood Sciences Laboratory, Arcata, CA. Employed: 5/90-8/90. Collected field data on dusky-footed woodrat ecology.

Student Conservation Association Resource Assistant: Bureau of Land Management, El Centro, CA. Employed: 5/89-7/89. Collected field data on horned lizard ecology.

#### PROFESSIONAL MEMBERSHIPS

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#### REFERENCES

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